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Date: June 27, 2002

By: ____________________
(Signature of person mailing paper or fee)

PATENT

Paper No. 4

File: Concir-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Brian J. McDermott, Jr., Daniel McGowan, Ralph Leo Spotts, and Sid Tryzbiak
Serial No.	:	09/694,099
Filed	:	20 October 2000
For	:	IMPROVED CIRCUIT BOARD OR OTHER MULTILAYER ELECTRICAL DEVICE MADE BY FORMING TEETH TO JOIN LAYERS
Group Art Unit	:	2827
Examiner	:	TUAN, Dinh T.

The Commissioner of Patents
and Trademarks
Washington, D.C. 20231

AMENDMENT AND RESPONSE

S I R :

In response to the Office Action mailed 27 February 2002, in the above-referenced patent application, please enter the following amendment and reconsider the application in view of the amendment and the remarks set forth below.

I. AMENDMENT

A. In the Claims

Please amend the claims as follows:

1.(Once Amended) A circuit board including:

a base;

a conductive layer adjacent to the base;

a dielectric material adjacent to conductive layer;

teeth, including a conductive coating and a metal layer, set in the dielectric material to join the dielectric material to the metal layer; and

wherein the metal layer is one of a plurality of layers of circuitry.

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2. (Once Amended) The circuit board of claim 1, wherein the layers have a peal strength greater than the peel strength of a single desmear process.

3. (Once Amended) The circuit board of claim 1, wherein the circuit board includes at least one micro via formed in the dielectric material.

4. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 20% of the teeth that are obtuse shaped.

5. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 50% of the teeth that are obtuse shaped.

6. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 20% of the teeth that are within the range of at least 1 tenth of a mil deep to 2 tenths of a mil deep.

7. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 50% of the teeth that are at least 1 tenth of a mil deep to 2 tenths of a mil deep.

8. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 20% of the teeth that are in the range of at least 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

9. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 50% of the teeth that are in the range of at least 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

10. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 5,000 teeth per linear inch.

11. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 10,000 teeth per linear inch.

12. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 15,000 teeth per linear inch.

13. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 25,000 teeth per square inch.

14. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 100,000 teeth per square inch.

15. (Once Amended) The circuit board of claim 1, wherein a sample of the circuit board has at least 200,000 teeth per square inch.

16. (Once Amended) The circuit board of claim 1, further including a tooth structure including the conductive layer.

17. (Once Amended) The circuit board of claim 1, further including a tooth structure, including the conductive layer set in the dielectric material, to join the conductive layer to the dielectric material; wherein,

the tooth structure is formed by an oxide replacement process; and wherein

the circuit board includes a micro via.

18. (Once Amended) The circuit board of claim 1, wherein the teeth are formed by a direct plate process.

19. (Once Amended) The circuit board of claim 1, wherein the teeth are formed by a double desmear process.

B. In the Abstract

Delete the Abstract and there insert—

A multilayer electrical device, such as a printed circuit board, having a tooth

structure including a metal layer set in a dielectric. The device includes a base; a conductive layer adjacent to the base; a dielectric material adjacent to conductive layer; a tooth structure including a metal layer set in the dielectric material to join the dielectric material to the metal layer; and wherein the metal layer forms a portion of circuitry in a circuit board having multiple layers of circuitry.--

C. In the Specification

At page 4; lines 36-37 delete from "the darker" through "area is" and there insert –show a dielectric material and--.

D. In the Title

Delete the title and there insert-- **CIRCUIT BOARD WITH TEETH JOINING LAYERS--.**

II. Remarks

The Examiner is requested to reconsider the application in view of the foregoing amendment and the following remarks. It is believed that no new matter has been added. Respectfully, and generally for the reasons set forth below, the objections and rejections and each ground therefor are traversed.

A. Paragraphs of Objections and\or Rejections

In paragraphs 1-3 of the Office Action, the Examiner has objected to the Abstract.

In response, the Abstract has been amended.

In paragraphs 4-5 of the Office Action, the Examiner has objected to the drawings.

In response, Applicant is providing a proposed Amendment to the Drawings and

corrected formal drawings. Support for the Amendment to the Drawings can be found throughout the specification, but particular attention is drawn to page 9, lines 5-9.

In a second paragraph numbered 1, the Examiner has objected to claims 2-19 pursuant to Sec. 112.

All claims have been amended.

In a second set of paragraphs numbered 2-3, the Examiner has rejected claims 16-17 pursuant to 35 U.S.C. Sec. 112. The Examiner contends that the specification is silent regarding "a second tooth structure."

In response, steps 6-8 include teeth including the dielectric material 8, conductive coating 10 and metal layer 18. Step 2 includes a tooth structure between dielectric material 8 and conductive layer 6. Attention is drawn to page 7, line 21-page 9, line 13.

In a second set of paragraphs numbered 4-5, the Examiner has rejected to claims 2-19 pursuant to Sec. 112.

All claims have been amended.

In paragraph 6, the Examiner has rejected to claims 1-19 pursuant to Sec. 112. The Examiner contends there is unclarity in the phrase "circuitry in a circuit board having multiple layers of circuitry."

All claims have been amended.

In a third set of paragraphs numbered 1-3, the Examiner has rejected all claims as variously anticipated pursuant to 35 U.S.C. Sec. 102 or 19 pursuant to 35 U.S.C. Sec. 103. The Examiner contends that all limitations of these claims are shown in, or obvious in view of, Larson.

In response, the rejection is respectfully traversed. Larson has teeth between 104 and 103, whereas claim 1 is directed to the area between 105 and 104, i.e., Larson does

not teach teeth, including a conductive coating and a metal layer...wherein the metal layer is one of a plurality of layers of circuitry. To the contrary, Larson teaches that 103 is "a good electrical insulator." Col. 5, lines 5-6. The remaining contentions are traversed as misdirected and beyond the teaching of Larson.

In a third paragraph numbered 4, the Examiner has made other art of record and contends that this is "prior art."

In response, Pommer is not "prior art" as it was filed after Applicant's priority date.

III. CONCLUSION

The application, as amended, is believed to be in condition for allowance, and favorable action is requested. It is believed that no new matter has been added.

If the prosecution of this case can be in any way advanced by a telephone discussion, the Examiner is requested to call the undersigned at (312) 240-0824.

Respectfully submitted,

Date: June 27, 2002

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AMENDED VERSION OF THE CLAIMS

S I R :

Set forth below is the amended version of the claims.

1.(Once Amended) A circuit board including:

a base;

a conductive layer adjacent to the base;

a dielectric material adjacent to conductive layer;

[a tooth structure]teeth, including a conductive coating and a metal layer, set in the dielectric material to join the dielectric material to the metal layer; and

wherein the metal layer [forms a portion of] is one of a plurality of layers of circuitry [in a circuit board having multiple layers of circuitry].

2. (Once Amended) The [electrical device] circuit board of claim 1, wherein the layers have a peal strength greater than the peel strength of a single desmear process.

3. (Once Amended) The [electrical device] circuit board of claim 1, wherein the circuit[ry] board includes at least one micro via formed in the dielectric material.

4. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 20% of the teeth that are obtuse shaped.

5. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 50% of the teeth that are obtuse shaped.

6. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 20% of the teeth that are within the range of at least 1 tenth of a mil deep to 2 tenths of a mil deep.

7. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at

least 50% of the teeth that are at least 1 tenth of a mil deep to 2 tenths of a mil deep.

8. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 20% of the teeth that are in the range of at least 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

9. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has, at least 50% of the teeth that are in the range of at least 1.5 tenths of a mil deep to 1.75 tenths of a mil deep.

10. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 5,000 teeth per linear inch [can be found].

11. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 10,000 teeth per linear inch [can be found].

12. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 15,000 teeth per linear inch [can be found].

13. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 25,000 teeth per square inch [can be found].

14. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 100,000 teeth per square inch [can be found].

15. (Once Amended) The [electrical device] circuit board of claim 1, wherein [the tooth structure includes teeth and in] a sample of the [electrical device] circuit board has[,] at least 200,000 teeth per square inch [can be found].

16. (Once Amended) The [electrical device] circuit board of claim 1, further including a [second] tooth structure [that is not set in the dielectric material] including the conductive layer.

17. (Once Amended) The [electrical device] circuit board of claim 1, further including a [second tooth structure a] tooth structure, including the conductive layer set in the dielectric material, to join the conductive layer to the dielectric material; wherein,

the [second] tooth structure is formed by an oxide replacement process; and

wherein

the [electrical] circuit[ry] board includes a [connection through a] micro via.

18. (Once Amended) The [electrical device] circuit board of claim 1, wherein the

[tooth structure is] teeth are formed by a direct plate process.

19. (Once Amended) The [electrical device] circuit board of claim 1, wherein the [tooth structure is] teeth are formed by a double desmear process.

The application, as amended, is believed to be in condition for allowance, and favorable action is requested. It is believed that no new matter has been added.

If the prosecution of this case can be in any way advanced by a telephone discussion, the Examiner is requested to call the undersigned at (312) 240-0824.

Respectfully submitted,

Date: June 27, 2002

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